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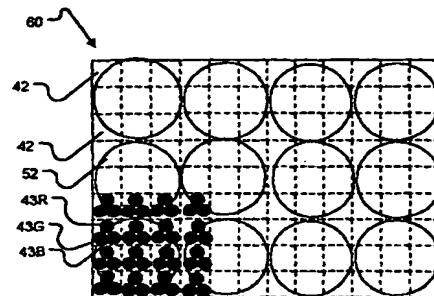
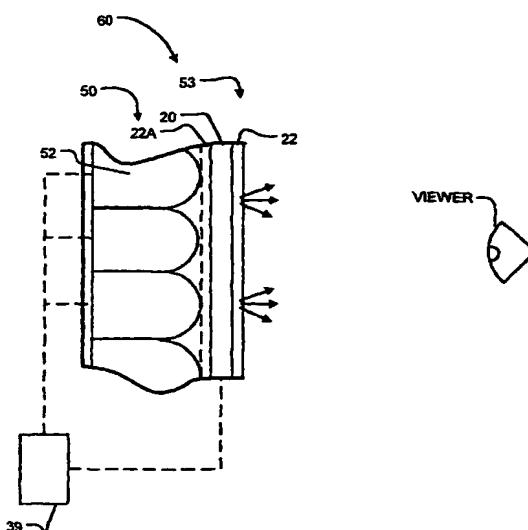
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Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i)) for all designations*
- *of inventorship (Rule 4.17(iv)) for US only*

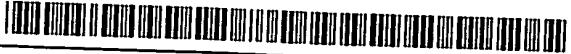
[Continued on next page]

(54) Title: HIGH DYNAMIC RANGE DISPLAY DEVICES



(57) Abstract: A display has a screen which incorporates a light modulator. The screen may be a front projection screen or a rear-projection screen. The screen is illuminated with light from a light source comprising an array of controllable light-emitters. The controllable-emitters and elements of the light modulator may be controlled to adjust the intensity of light emanating from corresponding areas on the screen. The display may provide a high dynamic range.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 03/00350

A. CLASSIFICATION OF SUBJECT MATTER	
IPC 7 G09G3/34	G09G3/32
G09G3/36	G02F1/13357 G02F1/1347

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G09G G02B G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 33483 A (MAY PAUL ;CAMBRIDGE DISPLAY TECH (GB)) 24 October 1996 (1996-10-24)	1-6,11, 13,14, 16-18, 21-30, 34-37, 47,48, 50,53,56
Y	page 8, last paragraph -page 10, line 4; figures 1-5 page 12, paragraph 2NDLAST -page 13, paragraph 1; figure 8 page 7, last paragraph -page 8, paragraph 2 page 12, paragraph 3 --- -/-	15, 31-33, 40-46, 49,54,55

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

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Date of mailing of the international search report

17/12/2003

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA 03/00350

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-11, 13-19, 21-50, 52-56

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-11,13-19,21-50,52-56

NB: Claims 1 - 6, 11, 13 - 19, 21 - 38, 40 - 50, 52 - 56 do not appear to be new or inventive:

Regarding claim 1:

D1 (WO 96/33483) discloses a display comprising:
a light source comprising a one-dimensional array of
light-emitting elements each having a controllable light
output (see "patterned backlight" and 17 in D1, page 8,
last paragraph - page 9, second paragraph & Fig. 3, 4, 5);
and

a spatial light modulator comprising a plurality of
controllable elements located to modulate light from the
light source (see "liquid crystal modulator" in D1, page 8,
last paragraph - page 10, line 4 & Fig. 1, 2, 5).

Regarding claim 52:

D4 (EP 829 747) discloses a display, which comprises all the
features recited in claim 52:

a light source (see "light source" in D4, Fig. 2);
a first spatial light modulator located to modulate light
from the light source, the first spatial light modulator
comprising an array of controllable pixels (see "first
modulator" in D4, Fig. 2 & col. 5, lines 27 - 37); and
a second spatial light modulator located to modulate light
from the first spatial light modulator, the second spatial
light modulator comprising an array of controllable pixels
(see "second modulator" in D4, Fig. 2 & col. 5, lines 27 -
37).

Claims 2 - 4, 18, 23 - 28, 36 - 37, 50 are also disclosed in
D1; claims 15, 31 - 33, 40 - 46, 49, 54 and 55 are disclosed
in combination with D2 (US 2001/0035853); claims 5, 6, 11,
13, 14, 16, 17, 19, 21, 22, 29 - 30, 34 - 35, 38, 47, 48
relate to well known features.

2. Claim : 12

3. Claims: 20, 51

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 03/00350

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2001/035853 A1 (HARBERS GERARD ET AL) 1 November 2001 (2001-11-01) paragraphs [0018], [0019], [0038]-[0040], [0045], [0049], [0050], [0060]; figures 1,2,3A	15, 31-33, 40-46, 49,54,55
X	WO 01 69584 A (IWATA AKIHIKO ;NAGAI HARUHIKO (JP); NISHINO KO (JP); KAMIZAWA SADA) 20 September 2001 (2001-09-20) -& EP 1 202 244 A (MITSHUBISHI ELECTRIC CORP) 2 May 2002 (2002-05-02) figures 1,18	1
X	EP 0 829 747 A (SEOS DISPLAYS LTD) 18 March 1998 (1998-03-18) cited in the application column 5, line 27 - line 37; figure 2	52
A	US 5 592 193 A (CHEN HSING-YAO) 7 January 1997 (1997-01-07) figures 2-6	1
A	WO 02 03687 A (ADKINS SEAN ;IMAX CORP (CA); ZHOU SAMUEL Z (CA); GIBBON MICHAEL A) 10 January 2002 (2002-01-10) cited in the application figure 1	1
P,X	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 07, 3 July 2002 (2002-07-03) & JP 2002 091385 A (MATSUSHITA ELECTRIC IND CO LTD), 27 March 2002 (2002-03-27) abstract	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 03/00350

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 9633483	A	24-10-1996	WO GB US	9633483 A1 2314196 A ,B 6111560 A	24-10-1996 17-12-1997 29-08-2000
US 2001035853	A1	01-11-2001	CN WO EP JP	1383499 T 0184225 A2 1281103 A2 2003532153 T	04-12-2002 08-11-2001 05-02-2003 28-10-2003
WO 0169584	A	20-09-2001	EP WO TW US	1202244 A1 0169584 A1 526369 B 2002135553 A1	02-05-2002 20-09-2001 01-04-2003 26-09-2002
EP 0829747	A	18-03-1998	GB CA EP US	2317290 A 2214863 A1 0829747 A1 5978142 A	18-03-1998 11-03-1998 18-03-1998 02-11-1999
US 5592193	A	07-01-1997	NONE		
WO 0203687	A	10-01-2002	AU CA CN EP WO	7887001 A 2414723 A1 1440617 T 1300008 A2 0203687 A2	14-01-2002 10-01-2002 03-09-2003 09-04-2003 10-01-2002
JP 2002091385	A	27-03-2002	NONE		

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